Linear Voltage Regulator – LM120K-5

Negative fixed 1.5A output Voltage Regulator in bare die form

Rev 1.0
06/12/19

Description

The LM120K-5 is a 3-terminal fixed -5V negative regulator. The device supplies up to 1.5A of output current and requires only x1 external compensation capacitor at the output. Overload immunity features include internal current limiting, safe-area compensation + thermal shutdown. The LM120K-5 can be used with external components to obtain adjustable voltages or currents and can also be used as the power-pass element in precision high-current voltage regulators. The part is performance rated over the full military temperature range.

Features:

- ±4% V_{OUT} tolerance over entire temperature range
- 1.5A Output Current
- 25V Input-Output voltage differential
- Internal thermal overload protection
- Internal short-circuit current limit
- High ripple rejection
- Full military temperature range
- Positive voltage complement is LM140K-5

Ordering Information

The following part suffixes apply:

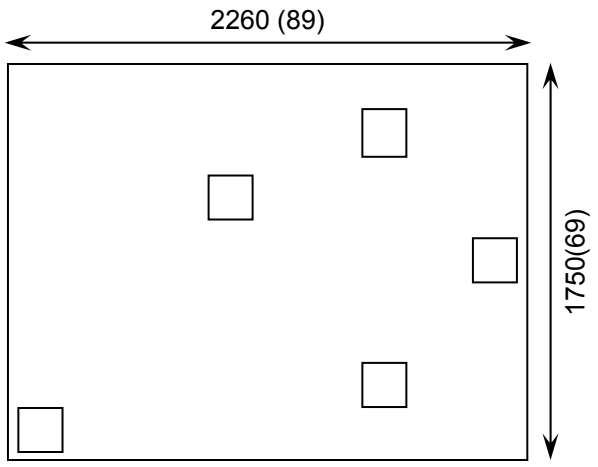
- No suffix - MIL-STD-883 /2010B Visual Inspection
- "**H**" - MIL-STD-883 /2010B Visual Inspection
  + MIL-PRF-38534 Class H LAT
- "**K**" - MIL-STD-883 /2010A Visual Inspection (Space)
  + MIL-PRF-38534 Class K LAT

LAT = Lot Acceptance Test.

For further information on LAT process flows see below.

www.siliconsupplies.com\quality\bare-die-lot-qualification

Die Dimensions in µm (mils)



Supply Formats:

- Default – Die in Waffle Pack (100 per tray capacity)
- Sawn Wafer on Tape – On request
- Unsawn Wafer – On request
- Tape & Reel – On request
- In Metal or Ceramic package – On request

Mechanical Specification

Die Size (Unsawn)	2260 x 1750 89 x 69	µm mils
Minimum Bond Pad Size	185 x 185 7.28 x 7.28	µm mils
Die Thickness	280 (±20) 11.02 (±0.79)	µm mils
Top Metal Composition	Al 1%Si 2.2µm	
Back Metal Composition	Ti/Ni/Ag 0.1-0.5-0.6µm	

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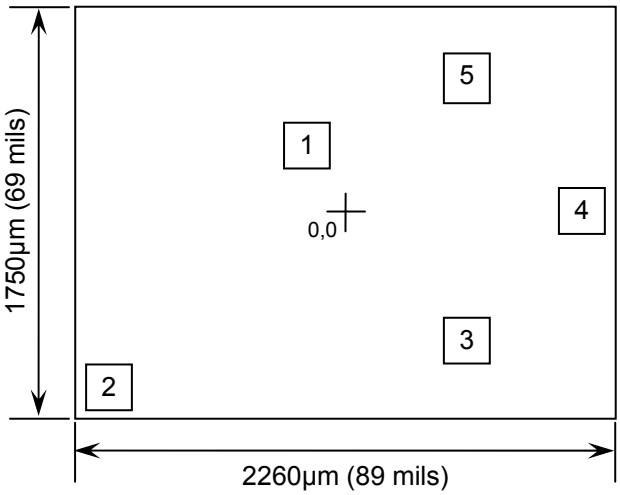
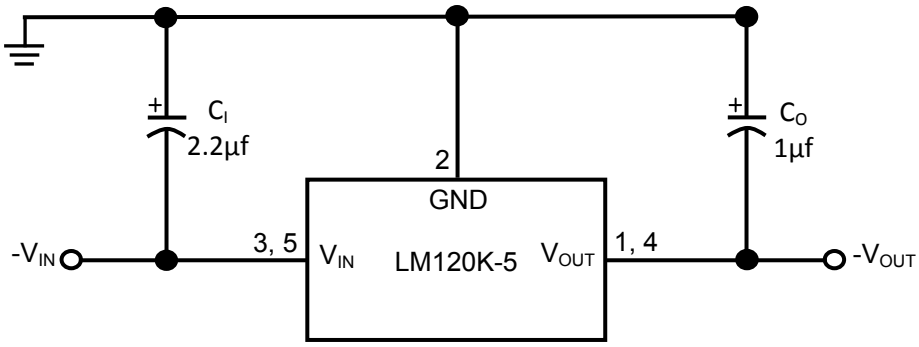
Pad Layout and Functions



PAD	FUNCTION	COORDINATES (µm)	
		X	Y
1	V_{OUT}	-178	279
2	GND	-1054	-768
3	V_{IN}	507	-558
4	V_{OUT}	1029	0
5	V_{IN}	508	570
CONNECT CHIP BACK TO V_{IN}			

Typical Application



C_I is required if the regulator is located an appreciable distance from power supply filter. C_O is required for stability. For optimum stability and transient response locate C_I C_O as close as possible to the regulator.

Figure 1 – Fixed Regulator

Absolute Maximum Ratings[1]

PARAMETER	SYMBOL	VALUE	UNIT
Input Voltage	V_{IN}	-25	V
Input-Output Voltage Differential	V_{IN}	25	V
Power Dissipation	P_D	Internally Limited	
Operating Junction Temperature	T_J	150	°C
Storage Temperature	T_{STG}	-65 to 150	°C

Recommended Operating Conditions

PARAMETER	SYMBOL	MIN	MAX	UNIT
Input Voltage	V_{IN}	-25	-7	V
Output Current	I_{OUT}	0.01	1.5	A
Operating Junction Temperature Range (Full Range)	T_J	-55 to 125		°C

DC Electrical Characteristics

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNITS
Output Voltage	V_{OUT}	V_{IN} = -10V, I_{OUT} = 5mA	T_J = 25°C	-5.1	-5	-4.9	V
		V_{IN} = -7.5V, I_{OUT} = 5mA	Full Range	-5.2	-	-4.8	V
		V_{IN} = -7.5V, I_{OUT} = 1.5A	Full Range	-5.2	-	-4.8	V
		V_{IN} = -25V, I_{OUT} = 5mA	Full Range	-5.2	-	-4.8	V
		V_{IN} = -25V, I_{OUT} = 1A	Full Range	-5.2	-	-4.8	V
Line Regulation	ΔV_{OUT}	-25V ≤ V_{IN} ≤ -7V, I_{OUT} = 5mA	T_J = 25°C	-25	-	25	mV
			Full Range	-50	-	50	
Load Regulation	ΔV_{OUT}	V_{IN} = -10V, 5mA ≤ I_{OUT} ≤ 1.5A	T_J = 25°C	-75	-	75	mV
			Full Range	-100	-	100	
Quiescent Current	I_Q	-25V ≤ V_{IN} ≤ -7V	T_J = 25°C	-	1	-	mA
			Full Range	-	-	2	
Quiescent Current Change	ΔI_Q	V_{IN} = -10V, 5mA ≤ I_{OUT} ≤ 1.5A	T_J = 25°C	-	0.1	0.4	mA
			Full Range	-	-	0.5	
		-25V ≤ V_{IN} ≤ -7V	T_J = 25°C	-	0.1	0.4	mA
			Full Range	-	-	0.5	

1. Operation above the absolute maximum rating may cause device failure. Operation at the absolute maximum ratings, for extended periods, may reduce device reliability.

DC Electrical Characteristics continued

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNITS
Output Noise Voltage	V_n	V_{IN} = -10V, I_{OUT} = 5mA 10 Hz ≤ f ≤ 100 kHz, C_L = 1µF	T_A = 25°C	-	150	-	µV
Short-Circuit Current	I_{OS}	V_{IN} = -25V	T_J = 25°C	0.4	-	3.0	A

AC Characteristics

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Ripple Rejection	RR	V_{IN} = -10V, I_{OUT} = 350mA V_{RIPPLE} = 1V_{RMS} , f_{RIPPLE} = 120Hz, T_A = 25°C	54	60	-	dB